UNIVERSITI PUTRA MALAYSIA

AN EXAMINATION OF THE CONDITIONAL AND UNCONDITIONAL RELATIONS BETWEEN RISK AND RETURN ON THE KUALA LUMPUR STOCK EXCHANGE

MOHD NIZAL BIN HANIFF

GSM 2001 11

AN EXAMINATION OF THE CONDITIONAL AND UNCONDITIONAL RELATIONS BETWEEN RISK AND RETURN ON THE KUALA LUMPUR STOCK EXCHANGE

by

MOHD NIZAL BIN HANIFF

Thesis Submitted in Fulfilment of the Requirements for the Degree of Master of Science in Finance at the Malaysian Graduate School of Management Universiti Putra Malaysia

May 2001

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science

AN EXAMINATION OF THE CONDITIONAL AND UNCONDITIONAL RELATIONS BETWEEN RISK AND RETURN ON THE KUALA LUMPUR STOCK EXCHANGE

BY

MOHD NIZAL HANIFF

2001

Chairman : Mohamad Ali Abdul Hamid, PhD
Faculty : Graduate School of Management

Previous empirical tests of the Capital Asset Pricing Model (CAPM) in mature and emerging capital markets focused on the premise that there is a positive linear relationship between portfolio betas and portfolio returns. The CAPM predicts that the expected return for any asset is a positive function of only three variables namely, beta (the covariance of asset return and market return), the risk free rate and the expected market return.

Earlier findings by Black, Jensen and Scholes (1972) and Fama and MacBeth (1973) in the US stock markets generally found a weak but positive relationship between portfolio returns and beta over the entire sample periods. However, this assertion was seriously challenged by the findings of Banz (1981) and Fama and French (1992) which evidence indicated the absence of a systematic relationship between beta and portfolio returns. Further evidence indicated that other variables such as size of the firm and the ratio of the book value of a firm's common equity to its market value

seemed to do better than beta in explaining the cross-sectional variations in average asset returns. Pettengill, Sundaram and Mathur (1995) offered a new interpretation of systematic relationship and introduced a new methodology to test the CAPM, which assumes a conditional relationship between portfolio returns and beta depending on whether the excess market return is positive or negative.

The main objective of the study is to examine this conditional relationship between beta and returns as proposed by Pettengill, Sundaram and Mathur (1995) to Malaysian stock returns. To study this relationship, monthly data for a period of 15 years between January 1985 and December 1999 were used. The study also looked at the impact of non-synchronous trading problem on the KLSE. In addition, the study also examined the impact of portfolio size on the systematic and conditional as well as unconditional relationships between beta and portfolio returns.

The results indicated that there was a very weak evidence of a significant risk premium on beta when the unconditional relationship between beta and portfolio returns was considered. When the sample was split into periods whether the excess market return is positive or negative, there was a significant relationship between portfolio returns and beta. The evidence also indicated that the size of portfolio had a positive linear relationship with the value of the cross-sectional coefficient under conditional relationship. However, the results did not support any positive reward for holding market risk during the sample period.

Abstrak thesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

SUATU PEMERIKSAAN KE ATAS HUBUNGAN BERSYARAT DAN HUBUNGAN TIDAK BERSYARAT DI ANTARA RISIKO DAN PULANGAN DI DALAM BURSA SAHAM KUALA LUMPUR

OLEH

MOHD NIZAL HANIFF

2001

Pengerusi : Mohamad Ali Abdul Hamid, PhD
Fakulti : Pusat Pengajian Siswazah Pengurusan

Ujian-ujian emperikal yang lalu ke atas Model Perletakan Harga Aset Modal (Capital Asset Pricing Model, CAPM) di dalam pasaran modal yang matang dan membangun menekankan kewujudan hubungan positif dan linear di antara beta sesuatu portfolio dan pulangannya. CAPM meramalkan bahawa jangkaan pulangan bagi sesuatu aset ialah fungsi positif ke atas tiga pembolehubah iaitu beta (kovarian bagi pulangan aset dan pulangan pasaran), kadar pulangan tanpa risiko dan jangkaan pulangan pasaran.

Hasil kajian terdahulu oleh Black, Jensen dan Scholes (1972) dan Fama dan MacBeth (1973) ke atas pasaran saham di Amerika Syarikat mendapati secara keseluruhan, terdapat hubungan positif yang lemah di antara pulangan portfolio dan beta ke atas tempoh jangka waktu sampel yang diambil. Walaubagaimanapun, kenyataan ini telah disanggah keras oleh hasil-hasil kajian Banz (1981) dan Fama dan French (1992) yang membuktikan ketidakwujudan hubungan sistematik di antara

beta dan pulangan portfolio. Bukti-bukti lain menunjukkan bahawa terdapat pembolehubah lain seperti saiz syarikat dan nisbah di antara nilai buku dengan nilai pasaran saham sesebuah syarikat, lebih mampu memberi penjelasan yang lebih nyata dari beta mengenai variasi keratan-lintang ke atas pulangan purata aset. Pettengill, Sundaram dan Mathur (1995) telah mengenengahkan suatu intepretasi baru mengenai hubungan sistematik di antara beta dan pulangan, dan memperkenalkan kaedah baru untuk menguji CAPM, dengan andaian bahawa wujudnya hubungan bersyarat di antara pulangan portfolio dan beta berdasarkan samada lebihan pulangan pasaran itu positif atau negatif.

Objektif utama kajian ini ialah untuk mengkaji hubungan bersyarat di antara beta dan pulangan seperti yang diajukan oleh Pettengill, Sundaram dan Mathur (1995), ke atas pulangan saham di Malaysia. Untuk meneliti hubungan ini, data bulanan bagi tempoh 15 tahun di antara January 1985 dan Disember 1999 telah digunakan. Kajian ini juga memeriksa kesan ke atas masalah dagangan tidak synchronous di BSKL. Kajian ini juga meneliti kesan saiz portfolio ke atas hubungan sistematik dan bersyarat, dan juga tidak bersyarat, di antara pulangan dan beta sesuatu portfolio.

Hasil kajian menunjukkan bahawa terdapat bukti yang sangat lemah mengenai kesan premium risiko ke atas beta apabila hubungan tidak bersyarat dikenakan ke atas beta dan pulangan portfolio. Setelah sampel dipecahkan mengikut jangka waktu samada lebihan pulangan pasaran itu positif atau negatif, suatu hubungan nyata di antara pulangan dan beta portfolio wujud. Bukti juga menunjukkan bahawa saiz portfolio mempunyai hubungan linear positif dengan nilai koefisyen keratan lintang di dalam

hubungan bersyarat. Walaubagaimanapun, hasil kajian tidak menyokong sebarang hasil pulangan positif dari memegang risiko pasaran sepanjang tempoh sampel tersebut.

ACKNOWLEDGEMENT

I would like to express my gratitude to the Almighty Allah – Syukur Alhamdulillah – for without His blessings this thesis would not have been completed in time.

I would also like to extend my appreciation to my thesis committee members, Associate Professor Dr. Mohamad Ali Abdul Hamid, Professor Dr. Annuar Md. Nassir and Dr. Huson Joher Alliahmed for their guidance, encouragement and patience throughout the preparation of this thesis.

I would like to express my love and appreciation to my family especially to my wife, Suzana who had been at my side offering support, love, patience and help in the preparation of this thesis. My loves also go to my lovely children Farah, Hariz and Sarah for brightening up my days throughout this demanding period.

Finally, my thanks also go to my dear friends Shukur, Norli and Shamsuwadt Zuha for their unselfish support, advice and encouragement. The same is also extended to all the staff of UPM who has been instrumental in the completion of this thesis.

I certify that an Examination Committee met on 8th of June 2001 to conduct the final examination of Mohd. Nizal Bin Haniff on his Master of Science thesis entitled " An Examination of the Conditional and Unconditional Relations Between Risk and Return on the Kuala Lumpur Stock Exchange" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980. The committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

Raduan Che Rose, Ph.D.
Graduate School of Management
Universiti Putra Malaysia
(Chairman)

Mohamad Ali Abdul Hamid, Ph.D.
Chairman for Master of Science Thesis Supervisory Committee
Graduate School of Management
Universiti Putra Malaysia
(Member)

Annuar Md. Nassir, Ph.D.
Professor/Head of Department of Finance and Accounting
Graduate School of Management
Universiti Putra Malaysia
(Member)

Huson Joher Aliahmed, Ph.D.
Graduate School of Management
Universiti Putra Malaysia
(Member)

Arfah Bt Salleh, Ph.D.
Associate Professor/Deputy Dean
Graduate School of Management
Universiti Putra Malaysia

Date :

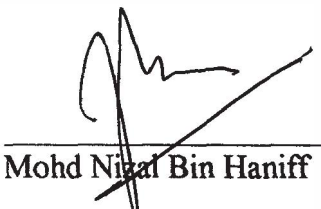
This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science.

Zainal Abidin Kidam
Associate Professor/Dean
Graduate School of Management
Universiti Putra Malaysia

Date :

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



Mohd Nizal Bin Haniff

Date : 8th June 2001

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AC	Aggregated Coefficient
AMEX	American Stock Exchange
CAPM	Capital Asset Pricing Model
CML	Capital Market Line
CRSP	Centre for Research in Securities Prices
FR	Fowler Rorke
KLSE	Kuala Lumpur Stock Exchange
BSKL	Bursa Saham Kuala Lumpur
NYSE	New York Stock Exchange
NASDAQ	National Association of Automatic Quote System
OLS	Ordinary Least Squares
SES	Stock Exchange of Singapore
SML	Security Market Line
UK	United Kingdom
USA	United States of America

CHAPTER 1

INTRODUCTION

Background of the Study

Modern portfolio theory categorises the risks inherent in common stocks into systematic and unsystematic risks. Systematic risk is the degree of correspondence of a security's price movements with the general stock market and this cannot be mitigated by means of diversification. Unsystematic risk on the other hand refers to company related risks and can be minimised without affecting expected portfolio returns either through the naïve or efficient diversification techniques (Jensen, 1968).

The development of the concept risk coefficient popularly referred to as beta is based on the Capital Asset Pricing Model (CAPM) (Sharpe-Lintner-Mossin) developed in the early 1960s. In theory, beta represents the non-diversifiable, systematic risk of an individual security or portfolio of securities. It reflects a risk for which a return should be expected. Securities' returns are undoubtedly affected by many economic factors, which include inflation, levels of productivity and resources prices. Since the market as a whole will also be affected by these forces the CAPM assumes that a security's sensitivity to movements of the market portfolio captures its sensitivity to all underlying forces as well. Thus, the single key risk factor is a security's sensitivity to the market portfolio. This relative sensitivity is called beta. The CAPM, which is predicated on the assumption of a positive risk-return trade-off, asserts that the expected return for any asset is a positive function of only three variables: beta (the covariance of asset return and market return), the risk-free rate and the expected market return. In this manner, the CAPM suggests that the appropriate measure of systematic risk for both efficiently and naively diversified

portfolios given an efficient market is beta. This suggestion implies that an asset's responsiveness to general market movements is the only variable to cause systematic differences in returns between assets. Therefore on average, the excess returns from a security an investor can expect above the risk-free rate is dependent solely on beta, which is the sensitivity of the security's return to the changes in market return. Thus a security with a beta of 1.0 is just as risky as the market. One with a beta of 0.5 is less risky and one with a beta of more than 1.0 are riskier than the market.

It is clear however, that the CAPM rests on a number of assumptions that are not strictly true in the real world. All investors are assumed to be risk averse and to have identical preferences about risk and return. Investors are assumed to care only about risk and return, so that their utility function admits only the mean and variance of the distribution of returns. In addition, the model assumes that all investors have identical expectations about the future risks and returns of all securities. All investors are also assumed to have the same tax rates and are able to borrow and lend at the risk-free rate without limits on the amount borrowed or lent and that no risky assets are excluded from the investment portfolio. Finally, the model assumes that there are no transaction costs and no costs of research. These in turn complicate the empirical testing of the model since its validity can only be assessed by examining how well it predicts real world phenomena.

Betas can be used by investment analysts as a benchmark to design portfolios to match the risk preferences of their clients i.e. for high risk (high return) profile, they should choose high beta stocks and for low risk (low return) profile, they should choose low beta stocks. The method can also be used to monitor the performance of portfolios of stocks against the market portfolio. A high beta portfolio may be expected to outperform the market when stock prices are rising. However, the

portfolio is expected to perform well if it performs better than predicted by theory. For example, if the portfolio has a beta of 1.5 and the market has an average return of 10 percent, then it is expected that the portfolio give a 15 percent return. A 12 percent return from the portfolio, even though better then the market, would be judged to be poor given the level of systematic risk (as measured by beta) of the portfolio. The use of beta has also enable financial managers to estimate the cost of equity capital using the CAPM. This equates the cost of equity to the risk free rate plus a market premium for risk depending on the beta of the firm. The great advantage claimed for using the CAPM over other methods of estimating the cost of equity is that the finance manager can calculate a cost which reflects investors' perceptions of the relative riskiness of their company's shares.

The model is quite versatile when combined with the cost of other sources of financing. It can be used to calculate the weighted average cost of capital, which can then be used as a cut-off rate to discount cash flows and determine the acceptability of capital investment proposals. For a number of years most large companies have built into their capital budgeting process the CAPM (see Jagannathan and McGrattan (1995)). This model was apparently successful in assessing the risk of the cash flow from a potential investment project, to estimate the project's cost of capital and the expected rate of return that investors will demand if they are to invest in the project. Thus to evaluate projects effectively, managers must understand how investors assess that risk and how they determine what risk premium to demand. According to the CAPM, the only relevant measure of a project's risk is a variable unique to this model, known as the project's beta. In other words, in the CAPM, the cost of capital is an exact linear function of the rate on a risk-free project and the beta of the project being evaluated. A manager who has an estimate of the beta of a potential project can

use the CAPM to estimate the cost of capital for the project. It is then argued that if the CAPM captures investors' behaviour adequately, then historical data should reveal a positive linear relation between the average return on financial assets and their betas. It is also argued that no other measure of risk should be able to explain the differences in average returns across financial assets that are not explained by CAPM betas.

Statement of Problem

Empirical tests of the positive risk-return trade-off, using average realised returns to proxy for expected returns and an index of equity security returns as a proxy for market returns, initially supported the validity of the CAPM (see Fama and MacBeth (1973)). However, the usefulness of beta as the single measure of risk for a security has been challenged by at least two arguments. First, research has challenged the concept of beta as the most efficient measure of systematic risk for individual securities. Chen, Roll and Ross (1986) for example, have argued in favour of measuring systematic responsiveness to several macroeconomic variables that include inflation, interest rate, risk premium and industrial production. They find that there is a significant relationship between the variables and the statistically identified systematic factors in stock returns. Furthermore, when beta was introduced as an additional variable along with the sensitivity of each portfolio to the macroeconomic variables, it did not show up as statistically significant in the cross-sectional regression. The second argument against beta is due to empirical findings by some researchers implying that either there is no risk-return trade-off or beta simply does not measure risk. Banz (1981) tested the CAPM by checking whether the size of the firms involved can explain the residual variation in average returns across assets that

is not explained by the CAPM's beta. Banz challenges the CAPM by showing that size does explain the cross-sectional variation in average returns on a particular collection of assets better than beta. He finds that during the 1936-1975, the average return to stocks of small firms in the USA (those with low values of market equity) was substantially higher than the average return to stocks of large firms after adjusting for risk using the CAPM. This observation has become known as the size effect.

Fama and French (1992) supported the above finding by Banz (1981). In a study for the period from July 1963 to December 1990 on stocks of firms listed on the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX) and the National Association of Security Dealers Automatic Quote System (NASDAQ), they concluded that the size effect is significant with or without betas. Their estimates indicate that for a large collection of stocks, beta has no ability to explain the cross-sectional variation in average returns, whereas size has substantial explanatory power. Fama and French (1992) also consider the ability of other attributes to account for this cross-sectional variation. When they include the ratio of the book value of a firm's common equity to its market value as an explanatory variable in addition to size, they find that this ratio can account for a substantial portion of the cross-sectional variation in average returns. In fact, book-to-market equity appears to be more powerful than size.

The absence of a systematic relationship between beta and security returns as discovered by Fama and French (1992) made later researchers scrambling to figure out just what was going on. Must the CAPM be abandoned and a new model developed? Or can the CAPM be modified in some way to make it a useful tool? Although Fama and French (1992) make a persuasive case against the CAPM, recent

studies have challenged their results. Kothari, Shanken, and Sloan (1995), for example, argue that Fama and French (1992) findings depend critically on how one interprets their statistical tests. They focus on Fama and French's estimates for the coefficient on beta, which have high standard errors therefore imply that a wide range of economically plausible risk premiums that cannot be rejected statistically. There have also been modifications of the original model of the CAPM not considered by Fama and French (1992) that appear to be consistent with data. Pettengill, Sundaram and Mathur (1995) argue that the use of beta may be justified as a measure of risk, even if beta is less efficient than alternative measures of systematic risk or is an incomplete measure of risk. However, if there is no systematic relationship between cross-sectional returns and beta, continued reliance on beta as a measure of risk is inappropriate. So far, evidences have not been conclusive on this. Despite these debates on the relevance of beta, Fama (1991) asserts that "...market professionals (and academics) still think about risk in terms of market beta." This preference for beta presumably results from the convenience of using a single factor to measure risk and the intuitive appeal of beta.

An alternative explanation of the flat relationship between portfolio return and beta advanced by Fama and French (1992) was proposed by Pettengill, Sundaram and Mathur (1995). They argued that the statistical methodology used by Fama and French (1992) to evaluate the relationship between beta and return requires adjustment to take into account of the fact that realised returns and not ex ante returns have been used in the tests. This is because the CAPM treats beta as a subjective estimate made by each individual of what the future might hold. It is an ex ante opinion of likely systematic risk during the next period of time. In practice however, it is rare that subjective estimates of beta are made, instead beta estimates

are usually based on the market model in which historical returns on a security in excess of a risk-free rate are regressed against excess returns on a proxy for the market portfolio. This ex post measure is commonly used as proxy for ex ante data. This in turn creates two possible biases in such beta estimates. The first bias is concerning the use of historical data in obtaining beta estimates. Historical data could be a poor predictor of the future as estimates will depend to a large degree on the time period chosen, and such estimates are often inaccurate predictors. The second bias looks at the reliability of beta over time. If the composition of the portfolio has changed over time, the beta associated with current holdings will not be the beta calculated from the past returns of different holdings and thus the beta measured will not be the beta for the current portfolio.

To tackle these limitations, Pettengill, Sundaram and Mathur (1995), developed a methodology which assumes a conditional relationship between return and beta, depending on whether, the excess return on the market index is positive or negative. In periods when the excess market return is positive (up market), there should be a positive relationship between beta and return. In periods when the excess market return is negative (down market), there should be a negative relationship between beta and return. They find that when the expectation concerning negative market excess returns are adjusted, there is a consistent and significant relationship between beta and returns for the entire sample, for sub sample periods, and for data divided by months in a year. This is because high beta stocks are more sensitive to the negative market excess return and will have a lower return than low beta stocks. The evidence in Pettengill, Sundaram and Mathur (1995) shows that for the period 1936-1990, there is a strong support for beta when the sample period is divided into up market and down market months. In addition, they also found that there is support

for a positive payment for beta risk. They concluded that since the concerns regarding the weak correlation between beta and the cross-section of returns appeared to be unfounded, the results support the continued use of beta as a measure of market risk.

Fletcher (1997) in the United Kingdom conducted a study using similar methodology. He studied the conditional relationship between beta and return in the UK between January 1975 and December 1994 and found that when the sample period was split into periods of whether the excess market return was positive or not, there was a significant positive relationship between beta and return in periods of positive excess market returns, and a significant negative relationship between beta and return in periods of negative excess market return. This is consistent with Pettengill, Sundaram and Mathur (1995), and suggests the need to focus on conditional relationship between beta and return. However, the conditional relationship between beta and return in up market and down market months was not symmetrical, as predicted by Pettengill, Sundaram and Mathur (1995). The relationship was stronger in down markets. This contradicts one of the conditions of the positive risk and return trade-off suggested by Pettengill, Sundaram and Mathur (1995). However, the results suggest that the market beta is still valid and useful as a measure of systematic risk.

Previous empirical studies in emerging capital markets also focused on the positive linear relationship (the unconditional relationship) between portfolio returns and beta. The findings of Ariff (1990), Bark (1991) and Annuar and Ariff (1998) do not seem to support the unconditional relationship between portfolio returns and systematic risk. In many of the cases, the tests for linear risk-return relationship and positive risk premium produced results, which appeared inconclusive. Thus the

validity of beta as a single measure of systematic risk could not be supported. The above two studies by Pettengill, Sundaram and Mathur (1995) and Fletcher (1997) were done in relation to developed and mature stock markets i.e. the USA and the UK stock markets. Could similar findings be found in an emerging market like the Malaysian stock market? If similar findings could be extended to emerging capital markets like the KLSE, it may well be that beta could still be a valid single measure of systematic risk. A review of past studies on testing the CAPM is exhibited in Appendix 1.

Objective of the Study

This paper examines the crucial assertion that beta has no systematic relationship with return. It will attempt to examine the cross sectional relationship between beta and return in Malaysian stock returns between January 1985 and December 1999. The main objective of the paper is to examine the conditional relationship between beta and return proposed by Pettengill, Sundaram and Mathur (1995) to Malaysian stock returns. The examination is done in order to compare the results of findings on an emerging capital market with similar test results in developed markets discussed above. More specifically the main objectives of this study may be outlined as follows:

1. To examine empirically the systematic relationship between realised portfolio returns and portfolio beta using the procedures developed by Fama and MacBeth (1973) on stock returns on the KLSE.
2. To investigate empirically the impact of the alternate interpretation of systematic relationship i.e. the Conditional Relation between beta and return

as proposed by Pettengill, Sundaram and Mathur (1995) on stock returns on the KLSE.

3. To test empirically whether a positive long-run trade-off between beta and average portfolio returns can be observed as predicted by the Capital Asset Pricing Model under both situation (1) and (2) above.
4. To examine whether size of portfolio has any impact on the systematic relationship between beta and realised return investigated in point (1) and (2) above.

As suggested by Pettengill, Sundaram and Mathur (1995), this study explicitly recognises the impact of using realised market returns to proxy for expected market returns. This study will not however address the influence of macroeconomic variables in describing returns as forwarded by Chen, Roll and Ross (1986). Finally, this study will take into account the impact of non-synchronous trading problem in emerging markets. The appropriate beta correction method will be applied to counter this problem. In this aspect the impact of uncorrected and corrected estimated betas on the systematic relationship between beta and portfolio return will be observed.

Significance of the Study

The new methodology introduced by Pettengill, Sundaram and Mathur (1995) focused on the conditional relationship between portfolio returns and beta. This offers a new angle on the interpretation of the systematic risk-return relationship and provides a new avenue in testing the validity of the CAPM. Recent findings by Fletcher (1997) generally supported the findings of Pettengill, Sundaram and Mathur